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# NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Docket Number (Optional)  
HRZ0003-US

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In re Application of

Herzel LAOR

Application Number

09/301,989

Filed

April 29, 1999

For

METHOD AND APPARATUS FOR CONDENSING A BOSE-EINSTEIN CONDENSATE OF ATOMS

Art Unit  
3641

Examiner  
Behrend, H.

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 1.17(b))

\$ 320.

☒ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is:

\$ 160.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account. I have enclosed a duplicate copy of this sheet.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 501458. I have enclosed a duplicate copy of this sheet.

☒ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.

**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☒ attorney or agent of record.

☐ attorney or agent acting under 37 CFR 1.34(a).

Registration number if acting under 37 CFR 1.34(a) \_\_\_\_\_.

*Thomas A. Louche Reg. No. 42439*  
\_\_\_\_\_  
Signature

George T. Marcou, Reg. No. 33,014

\_\_\_\_\_  
Typed or printed name

202 508 5800

\_\_\_\_\_  
Telephone number

September 8, 2003

\_\_\_\_\_  
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐ \*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.191. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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28  
Notice of Appeal  
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GROUP 3600  
10-29-03

Docket No. HRZ0003



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the U.S. Application of

Herzel LAOR

Group Art Unit: 3641

U.S. Serial No.: 09/301,989

Examiner: Behrend, H.

Filed: April 29, 1999

For: METHOD AND APPARATUS FOR CONDENSING A BOSE-EINSTEIN  
CONDENSATE OF ATOMS

#29  
PATENT 9-7-04  
**RECEIVED**  
SEP 10 2003  
**GROUP 3600**

**APPEAL BRIEF**

Box AF  
Assistant Commissioner of Patents  
Washington, D.C. 20231

Sir:

This is an Appeal Brief under 37 C.F.R. § 1.192 in connection with the decision of the Examiner mailed on May 8, 2003. Each of the topics required by Rule 192 is presented herewith and is labeled appropriately.

**(1) Real Party In Interest**

The real party in interest is Condensate Energy LLC.

**(2) Related Appeals And Interferences**

There are no other appeals or interferences related to this case.

**(3) Status Of Claims**

Claims 59-67 are pending.

**(4) Status of Amendments**

There are no outstanding amendments.

**(5) Summary Of The Invention**

The present invention is directed to a method and apparatus for, *inter alia*, compressing a condensate of atoms having an overlapping wave function. (Pg. 3, ll. 8-9). An example of an appropriate condensate of atoms is a Bose-Einstein condensate. (Pg. 3, ll. 24-25). More specifically, the atoms comprising the condensate may be selected from, for example, helium atoms, such as  $^4\text{He}$  atoms. (Pg. 3, ll. 25-29). The compression method involves exposing the condensate to an energy source, preferably a high energy beam, focused on the condensate to maximize the intensity of the beam's energy. (Pg. 3, ll. 12-14). The energy source is selected from the following group including, but not limited to, an electron beam, a particle beam, a radio frequency energy beam, a high energy laser beam, an x-ray beam, or the like. (Pg. 4, ll. 1-2). More particularly, a femtosecond or faster pulsed laser beam is preferable. (Pg. 4, l. 4). The compression and resulting de-condensing of the atoms comprising the condensate facilitate tunneling of the coulomb potential barrier and production of a heavier isotope. (Pg. 3, ll. 29-31; pg. 7, ll. 25-30). The apparatus for facilitating the compression also includes a reaction chamber and an injection mechanism. (Pg. 4, ll. 10-17).

**(6) Issues**

a) Whether the Examiner's objection to the specification and rejection of all of the claims under 35 U.S.C. § 112, first paragraph, is proper.

(i) *Written Description Requirement*

(ii) *Enablement Requirement*

b) Whether the Examiner's rejection of all of the claims under 35 U.S.C. § 101 is proper.

c) Whether the Examiner's rejection of claims 62-67 under 35 U.S.C. § 102(b) as being clearly anticipated by any of Lo (I) (US 4875213), Lo (II) (WO93/11543), Lo (III) (WO87/00681), Lo (IV) (US4926436), or Lo (V) (WO90/13130) is proper.

d) Whether the Examiner's rejection of claims 59-67 under 35 U.S.C. § 103(a) as being unpatentable over any of Lo(I-V) in view of any of Corkum, Schaffer, Olson, Laser Focus World or Optical Materials & Engineering News is proper.

**(7) Grouping of Claims**

Claims 59-67 are arranged into three groups as set forth below, wherein the claims within each group stand or fall together for purposes of this appeal.

GROUP	CLAIMS
I	59, 61 and 63-65
II	62
III	60, 66 and 67

**(8) Argument**

**The Objection To The Specification And The Rejection of Claims 59-67 Under 35. U.S.C. §112, First Paragraph Is Not Proper**

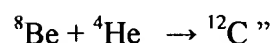
(i) *Written Description Requirement*

In paragraph 6 of the Final Office Action, the Examiner objects to the specification and rejects the claims, "as failing to comply with the written description requirement." To satisfy the written description requirement, a patent specification must describe the **claimed invention** in sufficient detail that **one skilled in the art** can reasonably conclude that the inventor has possession of the claimed invention. Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563 (Fed. Cir. 1991) (Emphasis Added). The subject matter of the claim need not be described literally (i.e., using the same terms verbatim or *in haec verba*) in order for the disclosure to satisfy the written description requirement under 35 U.S.C. § 112. MPEP § 2163.02. For purposes of fulfilling the written description requirement, the language of the pending claim limitations is found, virtually verbatim, within the specification. This language describes distinguishing, identifying characteristics that show that the Appellant was in possession of the claimed invention at the time of filing.

The Examiner has the initial burden, after a thorough reading and evaluation of the content of the application, of presenting evidence or reasons why a person skilled in the art would not recognize that the **written description of the invention provides support for the claims**. MPEP §2163(II)(A) (Emphasis added). The Examiner asserts, "There is no support in the original disclosure for stating that the first isotope formed (i.e. the  $^8\text{Be}$ ) is 'co-located' or has an 'overlapping wave function' with the  $^4\text{He}$  atom in the Bose-Einstein condensate." Initially, the undersigned representative wishes to point out that this language is not recited in claims 59, 61 or 63-65 of Group I or claim 62 of Group II. Consequently, this objection and resulting rejection are moot with respect to claims 59, 61 and 62-65. Second, with respect to claims 60, 66 and 67, of Group III, page 7, lines 25-30 states:

However, when two  $^4\text{He}$  atoms fuse, the resulting  $^8\text{Be}$  isotope is unstable, with a lifetime on the order of  $10^{-15}$  seconds. Also, the nuclear fusion of two  $^4\text{He}$  atoms is endothermic, so to create an energy-producing process, an additional  $^4\text{He}$  atom must be fused immediately with the unstable  $^8\text{Be}$  atom to create  $^{12}\text{C}$ . This second reaction produces substantial energy and emits a gamma ray.

This reaction is characterized in each of the provisional applications 60/083,517, 60/085,546 and 60/089,971 as:



One skilled in the art recognizes that the transitory isotope is produced and immediately fused with another co-located  $^4\text{He}$  atom within the Bose-Einstein condensate. Page 9, lines 27-31 states:

For example, in the reaction described above wherein two  $^4\text{He}$  atoms fuse, resulting in the unstable  $^8\text{Be}$  isotope whose lifetime is on the order of  $1 \times 10^{-15}$  seconds, the preferred beam 109 would have a pulse length of less than about  $1 \times 10^{-15}$  seconds so as to maximize the possibility of fusing the transitory  $^8\text{Be}$  isotope.

It is clearly states in the summary of the invention that:

The present invention involves a method and apparatus for providing a condensate including atoms having an overlapping wave function and exposing the condensate to a source of energy so that at least some of the co-located atoms fuse thereby releasing energy.

These excerpts from the specification clearly convey to one skilled in the art that the Appellant was in possession of the claimed invention at the time of filing the subject matter of claims 60, 66 and 67. Further, the Examiner's argument with respect to a Bose-Einstein condensate no longer existing once it is de-condensed is misplaced in view of the description on page 9 regarding the "compression and/or rapid de-condensing of the Bose-Einstein condensate." The first part of the

reaction " ${}^4\text{He} + {}^4\text{He} [= {}^8\text{Be}] + {}^4\text{He} \rightarrow {}^{12}\text{C} + \text{energy}$ " takes place during the rapid de-condensation process. This is clear to those skilled in the art.

(ii) *Enablement Requirement*

In paragraphs 2 and 3 of the Final Office Action, the Examiner objects to the specification and rejects the claims "as failing to adequately teach how to make and/or use the invention i.e., failing to provide an enabling disclosure, ..., " according to the requirements of 35 U.S.C. §112 first paragraph. The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent **coupled with information known in the art without undue experimentation**. United States v. Teletronics, Inc., 857 F.2d 778, 785 (Fed. Cir. 1988) (emphasis added). With regard to undue experimentation, the fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation. Massachusetts Institute of Technology v. A.B. Fortia, 774 F.2d 1104 (Fed. Cir. 1985). Further, there is no requirement that an Appellant actually has reduced the invention to practice prior to filing. In Gould v. Quigg, 822 F.2d 1074, 1078, 3 USPQ 2d 1302, 1304 (Fed. Cir. 1987), as of Gould's filing date, no person had built a light amplifier or measured a population inversion in a gas discharge. The Court held that "[t]he mere fact that something has not previously been done clearly is not, in itself, a sufficient basis for rejecting all applications purporting to disclose how to do it." 822 F.2d at 1078, 3 USPQ2d at 1304 (quoting *In re Chilowsky*, 229 F.2d 457, 461, 108 USPQ 321, 325 (CCPA 1956)).

Discussed herein are portions of the specification, coupled with the information known in the art, that enable the claimed subject matter without undue experimentation. In discussing the enablement of the claimed subject matter, it is important to bear in mind that the level of skill in

the atomic compression art is extremely high and the art is relatively complex, but the problems that have been identified by those skilled in the art have been reduced to a few specific areas of the art. The claims of the present application and the supporting specification are directed to these specific problem areas. Consequently, the disclosure need not elaborate on those well known and established areas of the compression art which have been exhaustively discussed in the literature. A specification which contains a teaching of the manner and process of making and using an invention in terms that correspond in scope to the claims must be taken as being in compliance unless there is reason to doubt the objection truth. MPEP 2164.04.

Addressed herein are each of the Examiner's concerns. First, on page 3 of the Final Office Action, the Examiner asserts lack of enablement for the following: "*providing a Bose-Einstein condensate comprised of multiple  $^4\text{He}$  atoms, wherein at least two of the  $^4\text{He}$  atoms within the Bose-Einstein condensate are co-located*" (Claim 59) and "*providing a Bose-Einstein condensate comprised of at least two atoms having overlapping wave functions*" (Claim 62). At least page 11 of the specification describes the providing steps of claims 59 and 62. Further, the undersigned representative supplies herewith at Attachments A and B, references that describe the skill in the art at the time the present application was filed. The reference "Making, probing and understanding Bose-Einstein condensates" by Ketterle et al.(Attachment A), though published shortly after the filing of the present application, cites numerous references disclosing the formation, i.e., providing of Bose-Einstein condensates, well in advance of the filing of the present application. Further, it is notoriously well known that Bose-Einstein condensates were formed in 1995 as is described in the tutorial provided at [www.colorado.edu/physics/2000/bec](http://www.colorado.edu/physics/2000/bec) (Attachment B). More particularly, the apparatus for achieving the Bose-Einstein condensate is shown in the



tutorial under the heading “How is BEC made? The Introduction.” Finally, the art, i.e., the Lo references, cited by the Examiner in the obviousness rejections of the claims, clearly teaches the formation of a Bose-Einstein condensate. As such, the description, combined with the skill in the art, enables the claimed invention. The undersigned representative kindly requests removal of this rejection.

Further on Page 3, the Examiner impermissibly reads limitations into the claims, stating “the formation of a Bose-Einstein condensate requires the use of a magnetic trap along with laser trapping and cooling.” (emphasis in original). And going on to state,

there is no enabling disclosure of how and in what manner, said magnetic trap (or the apparatus for producing said magnetic trap) as well as the laser means used for trapping and cooling could be operatively incorporated into Appellants reaction chamber 104 so as to show how to make and use Appellants claimed invention as required by statute.

Referring to the verbatim recitation above of the “providing” steps from claims 59 and 62, it is abundantly clear that the language cited by the Examiner is simply not recited in the claims.

Further, assuming *arguendo* that this language is somehow implicitly included in the claims, the skill in the art as shown in attachments A and B, was such that the claims are enabled. For example, pages 8-20 of Attachment A describe “Cooling, trapping, and manipulation techniques,” citing numerous pre-filing date articles describing these techniques which include, laser cooling and magnetic trapping. It is abundantly clear to those skilled in the art that these manipulations are performed within a vacuum chamber, similar to that of Figure 1.

Further to page 3 of the outstanding Office Action, the Examiner again impermissibly imports language into the claims. The “providing” steps recited in claims 59 and 62 do not recite,

*inter alia*, a “magnetic trap” or “laser means for the cooling and trapping” or “the Bose-Einstein condensate is to be first made in preparation chamber 124 and than transported/delivered to a desired point within reaction chamber 104.” Referring to page 11 of the specification, enablement for the claimed “providing” step of claims 59 and 62 is provided, among other places, as follows:

Fig. 2 shows a cut-away view of one embodiment of an introduction system 200 for introducing a Bose-Einstein condensate 202 into a reaction chamber 204. It will be appreciated that use of the introduction system 200 may include introducing a pre-formed Bose Einstein condensate into the reaction chamber 204, or may include introducing constituent atom into the reaction chamber 204 and thereafter forming the Bose-Einstein condensate 202 from the constituent atoms inside the reaction chamber 204. The Bose-Einstein condensate 202 may be propelled toward the reaction chamber 204 by gravitational force or another suitable force. It will be appreciated, however, that the types of such forces will vary in different embodiments of the invention. For example, laser beams may be used to optically trap and hold a Bose-Einstein condensate 202 in the reaction chamber 204 or optically trap and transport a Bose-Einstein condensate 202 into the reaction chamber 204.

This language, coupled with what was known in the art, enables the claimed “providing” limitations of claims 59 and 62 as set for the above. The undersigned representative kindly requests removal of this rejection.

On pages 3-5 of the Final Office Action, the Examiner asserts that the claims of Groups I and III, which include providing a Bose-Einstein condensate of  $^4\text{He}$ , are not enabled since actual reduction to practice of the formation of a Bose-Einstein condensate of  $^4\text{He}$  was not until 2001 according to the Perkins article. The test for enablement does not include a determination of when a claimed invention was actually reduced to practice. In fact, applicable authority clearly states that one need not have reduced an invention to practice --- the filing of the patent application is constructive reduction to practice. As set forth above, the test is whether one

skilled in the art could practice the invention without undue experimentation. It is well documented that at the time of the filing of this application, a Bose Einstein Condensate of superfluid  $^4\text{He}$  was known to those skilled in the art. Referring to attachment C, "Helium Joins Family of Gaseous Bose-Einstein Condensates," by Richard Fitzgerald, *Physics Today* May 2001, the author states, "[u]ntil 1995, Bose-Einstein condensation (BEC), could be found only in superfluid helium-4 and helium-3 and in the Cooper pairs of superconductors." And in attachment D, "Bose Einstein condensation," by John Doyle, *Proc. Natl. Acad. Sci.* Vol. 94, pp. 2774-2775, April 1997, it is stated,

The only material that does not become solid at low temperatures is liquid helium. When liquid helium is cooled below 2.2 K, a Bose condensate begins to form in the liquid. At these low temperatures, liquid helium behaves as a superfluid having, among other strange properties, zero viscosity.

Further, in attachment E, "Liquid Bose-Einstein condensate found," by Sid Perkins, *Science News* Feb. 7, 1998, pg. 95, "[a] new analysis of data obtained 8 years ago confirms a decades-old suspicion that a measurable fraction of the atoms in liquid helium fall into the peculiar quantum state known as a Bose-Einstein condensate." Consequently, at the time of constructive reduction to practice of the claimed invention, Bose-Einstein condensates of superfluid  $^4\text{He}$  were well known. The undersigned representative submits that the claimed invention as set forth in Groups I and III was indeed enabled as of the filing date of the present application as one skilled in the art could achieve the step of "*providing a Bose-Einstein condensate comprised of multiple  $^4\text{He}$  atoms*" without undue experimentation. The undersigned representative respectfully requests that this rejection be withdrawn.

The Examiner further asserts that, "if the condensate is de-condensed, it is no longer a condensate, i.e., the condensate is destroyed." (Final Office Action, Page 5). And that "[t]here is accordingly no adequate written description nor enabling disclosure of how and in what manner, one can meet the limitation in the last two lines of claim 59 or the last four lines of claim 62, since the condensate will be immediately de-condensed (destroyed) upon irradiation with the laser beam." With all due respect, the undersigned representative fails to follow this argument. The claim language describes compression of the condensate. The claim language does not describe a "de-condensed" or "destroyed" condensate in the claims. Compression does not equate to destruction. Compression is defined as "applying pressure," "the process or result of becoming smaller or pressed together," "the contraction of a gas on cooling," and "an increase in the density of something." See the "WordNet Dictionary" at [www.hyperdictionary.com](http://www.hyperdictionary.com). This argument simple does not make sense. Contrary to the Examiner's position that "[s]ince the condensate is de-condensed, it is not possible to have a 'resulting  $^8\text{Be}$  isotope' co-located with a  $^4\text{He}$  atoms within the Bose-Einstein condensate...", in fact, it is exactly the compression, i.e., the increased density, etc., of the condensate that facilitates the co-location of the  $^4\text{He}$  atoms. Accordingly, the undersigned representative respectfully requests that this rejection be withdrawn.

On page 6 of the Office Action, the Examiner references three of the Appellant's publications, asserting that the Appellant's statements are evidence of an insufficient and non-enabling disclosure. While the undersigned representative recognizes that if individuals of skill in the art state that a particular invention is not possible years after the filing date, that would be evidence that the disclosed invention was not possible at the time of filing --- the documents cited by the Examiner are not of this ilk. Instead, the documents cited by the Examiner support the

enablement of the invention. There is no pre-requisite for proof of 100% certainty. The Appellant has filed three provisional patent applications and the present utility application, that include detailed scientific reasoning, resulting reaction equations, as well as descriptions and drawings of reaction chambers and laser configurations and requirements, that are fully supportive of an enabling disclosure of the Appellant's conception and constructive reduction to practice of the claimed invention. The Appellant has described in detail the requirements for enabling the claimed invention.

Finally, the Examiner has refused to consider the teachings of the three provisional applications to which the present application claims priority since "said three applications have not been incorporated by reference." Initially, the undersigned representative wishes to point out that in this response and all previous responses, the substance of these provisional applications is not being cited in order to pre-date a reference, i.e., for priority, but instead the substance is referenced to further identify the skill in the art. Second, the three provisional applications are available for priority and written description support in so far as the subject matter overlaps with the subject matter of the utility application. Each of the three provisional applications are individually fully supportive of the claimed subject matter under 35 U.S.C. § 112.

The undersigned representative respectfully requests that the objections and rejections pursuant to 35 U.S.C. § 112 be removed for the reasons set forth herein and for the reasons set forth in the response dated 1/22/02 which are incorporated herein by reference.

**The Rejection of Claims 59-67 Under 35 U.S.C. § 101 Is Not Proper**

A rejection under 35 U.S.C. §101 is proper only where the Appellant has not claimed a useful invention, i.e., the claimed invention lacks utility. In this application, the Appellant has asserted a specific, substantial, and credible utility for the claimed atomic compression process: the generation of energy. (page 3, ll. 8-11). There is no requirement that the Appellant provide evidence sufficient to establish that an asserted utility is true "beyond a reasonable doubt." *In re Irons*, 340 F.2d 974, 978, 144 USPQ 351, 354 (CCPA 1965). Nor must an Appellant provide evidence such that it establishes an asserted utility as a matter of statistical certainty. *Nelson v. Bowler*, 626 F.2d 853, 856-57, 206 USPQ 881, 883-84 (CCPA 1980). Instead, evidence will be sufficient if, considered as a whole, it leads a person of ordinary skill in the art to conclude that the asserted utility is more likely than not true. According to the MPEP guidelines to the Examiner, "[i]f at any time during the examination, it becomes readily apparent that the claimed invention has a well-established utility, do not impose a rejection based on lack of utility." MPEP §2107 (emphasis added). The generation of energy through atomic compression is appreciated by those skilled in the art as "useful." This use is repeated and highlighted throughout the specification. (page 7, ll. 25-30). The claims are directed to the process steps contemplated and described for the generation of energy. Consequently, the Appellant's assertion of use is presumed true and this rejection is misplaced and improper.

In order to overcome the presumption of truth, "Office personnel must establish that it is more likely than not that one of ordinary skill in the art would doubt (i.e., "question") the truth of the statement of utility." MPEP 2107.02. "This means that if the applicant has presented facts that support the reasoning used in asserting a utility, Office personnel must present countervailing facts and reasoning sufficient to establish that a person of ordinary skill would not believe the applicant's assertion of utility." *In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995).

The Examiner has returned to the arguments regarding lack of enablement in order to support an inoperative rejection. These arguments have previously been addressed by the undersigned representative and will not be repeated herein. On page 8 of the Final Office Action, the Examiner has concocted a requirement that the claims must recite all of the limitations that result in the utility presented by the Appellant. The claims present various steps comprising the invented process for producing energy. There is no requirement that the claims recite all of steps in order to meet the utility requirement under 35 U.S.C. § 101. Further, contrary to the Examiner's assertion on page 8, the burden is not on the Appellant to provide "reputable evidence of record showing that one of ordinary skill in the art at the time of filing of the instant case, ... ." With respect to the single, arbitrary argument regarding femtosecond lasers from the 1997 Laser Focus World, the Appellant rebuts this misplaced argument by pointing out that this article actually lends credence to the availability and usefulness of femtosecond lasers. There is no requirement that the Appellant prove use of his invention, or a component thereof, in an industrial or mass production setting. The Appellant need only assert a specific, substantial, and credible utility --- which the Appellant has done. The Examiner has failed to provide countervailing facts and reasoning as to why a person of ordinary skill in the art would not believe the asserted utility to be true. For the reasons stated herein, the Appellant respectfully requests that the rejection under 35 U.S.C. §101 be withdrawn.

**The Rejection of Claims 62-67 Under 35 U.S.C. § 102(b) As Being Anticipated By Any of Lo (I-V) Is Not Proper**

Each of the Lo references, I-V, cited by the Examiner describes a method and system for, in essence, providing co-located atoms, or, said another way, providing atoms having overlapping wave functions. None of the Lo references perform the compression step required by independent claims 62. More particularly, independent claim 62 requires in addition to providing a Bose-Einstein condensate having at least two atoms having overlapping wavefunctions, the limitation of, "compressing the atoms having overlapping wave functions to facilitate tunneling through the potential energy barrier existing between the at least two atoms within the Bose-Einstein condensate, ... ." (emphasis added). None of the Lo references disclose this compression step.

For example, in Lo(I), the specification is directed to focusing an intense light from a laser on a superfluid to cause a coherent boson beam to be formed. This reference describes, at most, only the initial "providing step" of independent claim 62. The Lo(I) reference does not disclose compressing the coherent bosons to form an isotope as required by each of the pending claims. Consequently, Lo(I) cannot anticipate any of claims 62-67. Similarly, the Lo(III) reference is also drawn solely to, at best, the initial step of the independent claims, that is, the Lo(III) reference describes a method and system for providing co-located atoms or atoms having overlapping wavefunctions in the form of a coherent beam. Like Lo(I), there is no discussion in Lo(III) of compressing the coherent beam to form an isotope.

Similarly, Lo(II) refers to forming a coherent beam and does not describe the step of compressing the coherent atoms to form an isotope. As in the Lo(I) and Lo(III), the disclosure of Lo(II) is directed to forming coherent deuterium and alpha particles through ionization, but does not describe the additional necessary step of compression the coherent particles to form an



isotope. In Lo (V), the reference states, "[t]he deuterons in the described pellets are rendered strongly coupled or ultimately coherent by the incidence of the laser beam thereon, ... ."

Consequently, the Lo(V) reference does not anticipate the compression step. Finally, L(IV) is directed to accelerating coherent bosons, not compressing coherent bosons to form an isotope. The process described in L(IV) does not anticipate the steps of independent claim 62. and thus does not anticipate the claims of Groups II and III.

The Examiner refers specifically to the bottom of page 15 of the Lo(V) reference as indicating, "that coherent alphas will fuse to produce  $^8\text{Be}$ ." The bottom of page 15 refers to the interaction between coherent photons, coherent helium atoms or coherent bosons with deuterium to produce nuclear energy. This interaction between coherent photons, helium atoms or bosons and a mass, i.e., deuterium, does not anticipate the claimed limitations of, *inter alia*, providing a Bose-Einstein condensate having co-located atoms and compressing the co-located atoms to form an isotope. The claims do not require that the coherent particles interact with a mass, but rather that the coherent particles themselves be compressed, not just interact, so as to form an isotope. Claim 62 states, *inter alia*, "*compressing the atoms having overlapping wave functions to facilitate tunneling through the potential energy barrier existing between the at least two atoms within the Bose-Einstein condensate, wherein the tunneling through the potential energy barrier results in the formation of at least a first isotope within the Bose-Einstein condensate.*" Since the Lo references actually describe a completely different method for producing  $^8\text{Be}$ , i.e., requiring an additional mass for interaction with the coherent particles, the Lo references in effect teach away from the claimed method and it certainly cannot be said that the limitation cited above "necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd.

Pat. App. & Inter. 1990). As stated in 2112 of the MPEP, "[t]o establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.

Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Given that the Examiner has adamantly and repeatedly rejected the claims as not being enabling, not being supported by a written description and has basically challenged the credibility of the invention, it seems incredible to the Appellant that he now be allowed to use an inherency argument in order to reject the claims. Contrary to the rejections by the Examiner of the claims under 35 U.S.C. § 112, the Examiner now posits that applying a short laser pulse to a collection of atoms will inherently result in the claimed invention. The Examiner contradicts himself within his own Office Action. In effect the Examiner is holding the Appellant to a standard which he is not prepared to follow himself. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art). The Appellant hereby rebuts the inherency argument with the Examiner's own arguments made with regard to the Appellant's claims, e.g., questioning the availability of a short enough laser pulse and arguing that de-condensation/compression results in destruction, not formation of isotopes. The Appellant further notes that claims 66 and 67 require a second compression to form a second atom, i.e.,  $^{12}\text{C}$ , and that these limitations have not been addressed

by the Examiner. As with the above-identified first compression requirement, none of the Lo references anticipate this second compression requirement to form a second atom. As such, the claims of Group III are clearly allowable over the Lo references.

The Lo references clearly do not anticipate or teach or suggest, either explicitly or inherently, the limitations of claims 62-67.

**The Rejection of Claims 59-67 Under 35 U.S.C. § 103(a) As Being Unpatentable Over Any of Lo (I-V) View of Any of Corkum, Schaffer, Olson, Laser Focus World or Optical Materials & Engineering News is Not Proper**

Referring to the arguments above, none of the primary references, Lo(I) through Lo(V), anticipate the limitations of claims 62-67, further, the rejection of claims 59-61 under the Lo references has been withdrawn by the Examiner. The examiner has made no further rejection of claims 59-61 and the additional references cited in the rejection under 35 U.S.C. § 103(a) clearly do not teach or suggest the limitations of claims 59-61 as they were cited with reference to the femtosecond laser limitations. Accordingly, it is believed that claims 59-61 are allowable over the cited prior art. Further, with respect to claims 62-67, the references cited do not suggest the required limitation of compressing coherent atoms of a Bose-Einstein condensate to form an isotope (Claims 62-65) or a second atom (Claims 66-67). None of the secondary references cited by the Examiner suggest these missing limitations. Instead, these secondary references are cited to show the use of femtosecond lasers in the fusion art. Consequently, none of the references cited, either alone or in combination, anticipate or render obvious the limitations of the pending claims. As such, the Appellant respectfully requests that the Examiner's rejections be withdrawn and the claims allowed for the reasons stated herein.

**(9) Conclusion**

For at least the reasons given above, the rejections of claims 59-67 are improper. Appellant respectfully requests that the final rejection by the Examiner be reversed and claims 59-67 be allowed. Attached below for the Board's convenience is an Appendix which lists the currently pending claims. Also, attached at Attachment F is a copy of the file history, including copies of the three provisional applications to which the current application claims priority.

Respectfully submitted,

Herzel LAOR

Date:

9/4/03

KILPATRICK STOCKTON LLP

Suite 900

607 14th Street, N.W.

Washington, D.C. 20005

(202) 508-5800

GTM/DMB/260226/112148v.1

By:

Dawn-Marie Bey

Dawn-Marie Bey

Registration No. 44,442

**APPENDIX**

59. A process for compressing atoms within a Bose-Einstein condensate comprising:  
providing a Bose-Einstein condensate comprised of multiple  $^4\text{He}$  atoms, wherein at least two of the  $^4\text{He}$  atoms within the Bose-Einstein condensate are co-located;  
focusing a beam having a pulse length of less than  $1 \times 10^{-15}$  second on the Bose-Einstein condensate such that the co-located at least two  $^4\text{He}$  atoms compress to form a  $^8\text{Be}$  isotope.
60. The process according to claim 59, wherein the resulting  $^8\text{Be}$  isotope is co-located with a  $^4\text{He}$  atom within the Bose-Einstein condensate and further wherein the interaction between the beam and the co-located  $^8\text{Be}$  isotope and the  $^4\text{He}$  atom results in at least a  $^{12}\text{C}$  atom.
61. The process according to claim 59, wherein the beam is focusing on the Bose-Einstein condensate from at least two opposite directions.
62. A process for tunneling through a potential energy barrier between at least two atoms comprising:  
providing a Bose-Einstein condensate comprised of at least two atoms having overlapping wave functions; and  
compressing the atoms having overlapping wave functions to facilitate tunneling through the potential energy barrier existing between the at least two atoms within the Bose-Einstein condensate, wherein the tunneling through the potential energy barrier results in the formation of at least a first isotope within the Bose-Einstein condensate.
63. The process according to claim 62, wherein the at least two atoms are  $^4\text{He}$  atoms.
64. The process according to claim 62, wherein the first isotope is  $^8\text{Be}$ .

65. The process according to claim 62, wherein the first isotope has a lifetime on the order of  $1 \times 10^{-15}$  seconds and during the lifetime has an overlapping wave function with a  $^4\text{He}$  atom within the Bose-Einstein condensate.

66. The process according to claim 65, further comprising:  
compressing the first isotope and the  $^4\text{He}$  atom with the overlapping wave functions in order to form at least a second atom.

67. The process according to claim 66, wherein the second atom is  $^{12}\text{C}$ .